

**Engagement Opportunities in NASA STEM 2023 (EONS-2023)**  
**NASA Research Announcement (NRA)**  
**MUREP Space Technology Artemis Research (M-STAR)**  
**Number: NNH23ZHA001N-MSTAR**

**Title:** DREAM : Developing Robotic Exploration with Agrobots and Moonbots

**Institution:** University of Maryland, Eastern Shore

**City/State:** Princess Anne, Maryland

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**FY:** 2023

Summary: The Artemis project is a NASA-led initiative aimed at returning humans to the moon by 2025/26, with the goal of establishing a sustainable presence on the lunar surface, which provides unique challenges for our nation and our international partners. The proposed DREAM (Developing Robotic Exploration with Agrobots and Moonbots) project will champion the M-STAR (MUREP Space Technology Artemis Research) goal to involve citizens and students from all cross-sections of society to participate in advancing untapped frontiers of knowledge with the vast potential for transformative innovations that will pave the way towards a more sustainable and prosperous future for all.

The project will be led by the University of Maryland Eastern Shore (UMES), an 1890 land grant historically black institution (HBCU) in partnership with the University of Maryland College Park (UMD), the state's flagship university. The DREAM project will involve a diverse body of students with the challenges and opportunities related to the Artemis project. HBCUs have a rich history of producing graduates who have made significant contributions to STEM fields, including space exploration. However, HBCUs are often underrepresented in the broader space exploration community, with limited exposure to cutting-edge research and development projects. UMD on the other hand is one of the nation's preeminent public research universities and has a strong student body in the undergraduate and graduate levels in engineering and related STEM fields, laboratory facilities and infrastructure, and a history of involvement in NASA's lunar robotic exploration related research projects. The DREAM project will leverage the existing capabilities at UMD, and build capacity at UMES to enable the involvement of a diverse student body on campus to meaningfully engage in activities aligned with the broad scope of the Artemis project.

UMES efforts related to remote sensing, smart farming, and precision agriculture have engaged STEM undergraduates as well as graduate students in the food science and technology (FDST) graduate program on campus in the development and utilization of terrestrial robotic platforms in land, air, and water. UMES STEM students have also been engaged in several robotics and automation related activities including soft robotics, flexible automation using industrial robot arms, as well as robotic arms that can seed, weed, irrigate, and grow specialty crops with minimal human intervention in both indoor and outdoor settings.

The three objectives identified by the DREAM project leadership team are: (i) experiential learning and research involving lunar robotic exploration with wheeled and legged robots, (ii) advances towards controlled environment robotic agriculture on the moon, and (iii) development of enrichment activities, and infusion of Artemis project related content in courses and curricula at UMES and UMD. It is envisioned that the DREAM project will lay the foundation for sustained progress of UMES STEM programs in general, and engineering and aviation programs in particular for the foreseeable future. Besides UMD, the UMES DREAM project will expand on existing relations with Maryland Space Grant Consortium (MDSGC), NASA's Wallops Flight Facility (WFF) of Goddard Space Flight Center (GSFC), and Johns Hopkins Applied Physics Laboratory (APL) to excite students for engaging them in creative endeavors aligned with NASA's mission objectives related to space and earth sciences. While the DREAM project will be largely aligned with NASA's Space Technology Mission Directorate (STMD) goals and objectives, the overarching aim of the Artemis project to establish a sustainable human presence on the moon by the end of the decade is likely to offer valuable lessons and solutions for sustainability issues here on earth and advance our understanding of the broader universe at large.